

NOMENCLATRURAL NOTES ON GOSSYPIUM (MALVACEAE)<sup>1</sup>

GEORGE K. BRIZICKY

IN THE COURSE OF SURVEYING the genera of Malvaceae in the southeastern United States, I encountered in the genus *Gossypium* several nomenclatural problems which require further comments. These include the type species of *Gossypium*; the nomenclatural status of *G. barbadense* L.; and the sectional names in Hutchinson's classification of *Gossypium* (1947). These problems are dealt with separately below.

## THE TYPE SPECIES OF GOSSYPIUM

In 1920, Britton & Brown (Bahama Fl. 273. 1920) designated *Gossypium arboreum* L. as the lectotype species of *Gossypium* L. This choice of lectotype, apparently the earliest for this genus, was also adopted by Britton and Wilson in their *Botany of Porto Rico and the Virgin Islands* (Sci. Surv. Porto Rico Virgin Is. 5(4): 566. 1924). In 1929, however, Hitchcock and Green (Int. Bot. Congr. Cambridge 1930. Nomencl. Propos. Brit. Bot. 173. 1929), apparently overlooking Britton & Millspaugh's typification, proposed *G. herbaceum* L. as the type of *Gossypium*. This typification has been adopted by at least Prokhanov (Bot. Zhur. SSSR 32: 66. 1947), Phillips (Genera S. Afr. Flower. Pl. ed. 2. 501. 1951), and Hu (Malvaceae. Fl. China, Fam. 153. 61. 1955). Since Britton & Millspaugh's choice of the lectotype species of *Gossypium* L. appears to be the earliest, antedates that of Hitchcock and Green, and does not contradict the *International Code of Botanical Nomenclature*, it must be followed (see ICBN. p. 20. Art. 8 & p. 64. point 4f. 1961).

## THE NOMENCLATRURAL STATUS OF GOSSYPIUM BARBADENSE L.

It took botanists about a century and a half to form a notion of *Gossypium barbadense* L. and a further half-century to learn that their concept has been wrong and that the species so called must bear the name *G. peruvianum* Cav. (correctly, *G. vitifolium* Lam.), while *G. barbadense* L. has to be reduced to the synonymy of *G. arboreum* L. Since some taxonomists have accepted the proposed change, while others have not, this economically important species is at present variously called *G. barbadense* L., *G. peruvianum* Cav., and *G. vitifolium* Lam., with consequent nomenclatural and taxonomic confusion. Since rejection of a well-established

<sup>1</sup> Continuing a series of miscellaneous notes and papers on the flora of the southeastern United States made possible through the interest and support of George R. Cooley and grants from the National Science Foundation.

and generally used scientific name of an economically important plant usually is undesirable and regrettable, any proposal of such a change should be thoroughly discussed, and eventually the necessity of renaming should be reinvestigated. For this reason a review of the nomenclatural status of *G. barbadense* L. would seem to be useful.

The protologue for *Gossypium barbadense* Linnaeus (Sp. Pl. 2: 693. 1753) consists of the following parts: 1) the Linnaean diagnosis, taken from his *Hortus Upsaliensis* (p. 204. 1748), "Gossypium foliis trilobis integerrimis"; 2) Plukenet's phrase-name (Almagest. Bot. 172. 1696), "Gossypium frutescens annuum, folio trilobo [trilobato], barbadense," and a reference to Plukenet's illustration "[Phytogr.] t. 188. f. 1"; and 3) the habitat and growth form of the species, "*Habitat in* Barbados," followed by the symbols for "biennial" and "shrub."

The Linnaean *nomen specificum legitimum* (phrase name or diagnosis) seems to refer to the plant grown in the Botanical Garden in Uppsala, because besides the diagnosis the following note and a brief description of this plant are given by Linnaeus in *Hortus Upsaliensis* (*loc. cit.*), "Hospitantur in *Caldario*, biennis, altero anno fructificans. *Desc.* Folia cordata, triloba, integerrima, hinc diversa, licet fruticosa videatur, a Gossypio caule erecto. *Hort. cliff.* 350." On the other hand, the circumstance that Linnaeus applied to his species the epithet *barbadense* taken from Plukenet's diagnostic name, seems to indicate that he based his species on that of Plukenet, which he knew only from the phrase-name and illustration. He apparently believed the plant grown in the botanical garden in Uppsala to be conspecific with that of Plukenet. Thus, *G. barbadense* L. was a mixture of two elements, the plant grown at Uppsala and the species established by Plukenet. Although the vast majority of post-Linnaean botanists considered both elements to be conspecific, Todaro (Osservaz. Talun. Spec. Cotone 90. 1863) regarded *G. barbadense* as based only on the plant cultivated in the botanical garden in Uppsala and described by Linnaeus for the first time in *Hortus Upsaliensis*. "The *G. barbadense* is to us a plant fairly uncertain; it was for the first time described from the Garden in Uppsala. . . The *G. barbadense* is not, as we have believed, a plant described from the illustration of Plukenet, but certainly from the living plant cultivated in the Botanical Garden in Uppsala." (Translation supplied.) Consequently, Todaro removed Plukenet's phrase-name and the reference to his illustration from the synonymy of *G. barbadense* L., but in his later work (Relaz. Cult. Cotoni 234. 1877) he returned both. However, he then believed this species to be different from his *G. maritimum*, the Sea Island cotton, and to occur spontaneously on Barbados (*loc. cit.* 236).

Contrary to Todaro, Watt (Wild Cultiv. Cotton 268, 269. 1907) typified *Gossypium barbadense* by Plukenet's plant, saying: "There can, however, be little doubt as to the botanical type of the species. It was founded by Linnaeus on the description and plate given by Plukenet. . . In the second edition of the 'Species Plantarum' Linnaeus added the information that the leaves below had three glands, but it seems doubtful whether this

supplementary feature is a constant characteristic or may not rather be an acquired one through hybridization or adaptation to insect visitors. Plukenet's specimen is in the Sloane Herbarium of the British Museum (vol. 100, f. 105 and Ray 1064-1), and is therefore the absolute type of the species as originally conceived. It is reproduced here (see Plate 46 A). It was fairly accurately represented by Plukenet's figure, also for convenience reproduced by me (Plate 46 B), except that the fruit shown is not present on the specimen." Taking into consideration the confusion (which goes back even to Plukenet himself) surrounding Plukenet's species, Watt further stated that "while accepting his [Plukenet's] t. 188, f. 1 (Plate 46 B) as the type of the species (as Linnaeus did), we must exclude all the synonyms cited by Plukenet." Watt seems to be the first to identify the plant in the Linnaean Herbarium, which bears on the sheet a mark "HU" [*Hortus Upsaliensis*] and an inscription in Linnaeus's handwriting "barbadense?", as *Gossypium obtusifolium* Roxb., which is now included in *G. arboreum* L. This presumably was the plant grown in Uppsala and described by Linnaeus in *Hortus Upsaliensis* as "*Gossypium foliis trilobis integerrimis*," e.g., the type of *G. barbadense*, in Todaro's opinion.

Todaro's (1863) typification was supported and adopted by Prokhanov (Bot. Zhur. SSSR 32: 67. 1947) who reviewed in detail (in Taxon 8: 41-46. 1959) the nomenclatural status of *Gossypium barbadense* L. and came to the following conclusions: "(1) *Gossypium barbadense*, in the original sense of Linnaeus, is merely a broad-leaved variety of *G. arboreum* L. It must bear the name *G. arboreum* L. var. *nadam* (Watt) Prokh. [*G. obtusifolium* Roxb. s. str.], thus the name *G. barbadense* L. becomes a synonym of *G. arboreum* L., and in practice has to be eliminated. (2) The specific epithet *barbadense* is due here to its arbitrary transference by Linnaeus from former collective species of Plukenet. No cotton of the South American group was ever described by Linnaeus. (3) The species of *Gossypium*, up till now erroneously named *G. barbadense* and representing the South American group, must bear as its proper name, *Gossypium peruvianum* Cav. [correctly, the earlier *G. vitifolium* Lam.]." Prokhanov's proposal, although adopted by several Eurasian and American botanists, has not met with general recognition, most authors following Watt's typification, which I shall review later on.

Although Todaro's and Prokhanov's assumption that *Gossypium barbadense* L. was based only on the living plant grown in the Botanical Garden in Uppsala and described by Linnaeus in *Hortus Upsaliensis* does not appear to be quite correct, Todaro and Prokhanov were fully justified in typifying this species by that element. Nevertheless, this typification may be objected to because of the fact that Prokhanov's identification of the above-mentioned plant (made solely on the basis of the Linnaean diagnosis, note, and a very incomplete description) as a broad-leaved variety of *Gossypium arboreum* seems to be fairly unreliable and unconvincing, being an educated guess rather than a determination. Certainly, the specimen from the Linnaean Herbarium, bearing a mark "HU" [*Hortus Upsaliensis*] and Linnaeus's inscription "barbadense?" must be the basis

for identification of the type of *G. barbadense* L. in the sense of Todaro (1863) and Prokhanov (1959). This specimen, then, presumably representing the plant grown in Uppsala and determined by Prokhanov as *Gossypium arboreum* L. var. *nadam* (Watt) Prokh., should be chosen as the lectotype of *G. barbadense* L. in the sense of Todaro and Prokhanov. However, "in choosing a lectotype, any indication of intent by the author of a name should be given preference unless such indication is contrary to the protologue. Such indications are manuscript notes, annotations on herbarium sheets," etc. (ICBN. 65. 1961). The specimen of the Linnaean Herbarium (874.5), identified by Watt as *G. obtusifolium* Roxb. and by Prokhanov as *G. arboreum* L. var. *nadam* (Watt) Prokh., was annotated by Linnaeus himself as "barbadense?". Designation of this specimen, only questionably referred by Linnaeus to *G. barbadense*, as the lectotype of this species can hardly be justifiable from the standpoint of the *Code*. Consequently, Prokhanov's typification of *G. barbadense* L. with the plant grown in the botanical garden in Uppsala and allegedly represented in the Herbarium Linnaeanum by the specimen of *G. arboreum* L. var. *nadam* (Watt) Prokh. can not be accepted.

As mentioned before, Watt (*loc. cit.*) typified *G. barbadense* L. by Plukenet's plate [Phytogr.] *tab. 188, fig. 1*, clearly saying that *G. barbadense* L. "was founded by Linnaeus on the description and plate given by Plukenet" and that "accepting his [Plukenet's] t. 188, f. 1 (Plate 46 B) as the type of the species (as Linnaeus did), we must exclude all the synonyms cited by Plukenet." Despite the clarity of Watt's typification, his further statement that Plukenet's specimen in the Sloane Herbarium is "the absolute type of the species as originally conceived [by Plukenet, not Linnaeus]," was misunderstood as Watt's choice of Plukenet's specimen as the lectotype of *G. barbadense* (e.g., Hutchinson in Hutchinson, Silow & Stephens, *Evol. Gossypium* 48. 1947). Recently, however, Wouters (*Bull. Jard. Bot. Bruxelles* 33: 516. 1963) really assumed Plukenet's specimen to be the type of *G. barbadense*. "Il est donc normal de considérer le spécimen *Plukenet vol. 100, folio 105* comme le modèle de la planche t. 188 fig. 1 de Plukenet, et par conséquent comme le type nomenclatural de *G. barbadense* L. 1753. Il représente indiscutablement *G. barbadense* sensu stricto." Wouters's assumption, however tempting, may be objected to on the following grounds. 1) The specimen *Plukenet vol. 100, folio 105* was not that from which Plukenet's illustration was drawn; this herbarium specimen, lacking any inscription by Plukenet, was arbitrarily designated by Watt (*loc. cit.*) as "the absolute type of the species as originally conceived," only on the basis of similarity of the leaf-shape of the specimen to that of the illustration. Regarding the true model for Plukenet's illustration Watt (*loc. cit.* 269) says the following: "In vol. 132, f. 18 (Duchess of Beaufort's set of plants) there is a specimen, said to represent Plukenet's 'Phyt.' t. 188, f. 1, but which is nearer to the leaves in his herbarium just mentioned [i.e., those of *G. vitifolium* Lam., which was regarded as a distinct species by Watt]." 2) Since the Plukenet specimen in the Sloane Herbarium was not the model for Plukenet's illustration,

there is no reason at all for choosing it as the lectotype of *G. barbadense*, because "A lectotype must be chosen from among elements that were definitely studied by the author up to the time the name of the taxon was published and included in the catalogue" (ICBN. 64. 1961).

On the contrary, Watt's choice of Plukenet's illustration (Phytogr. tab. 188, fig. 1) as the lectotype of *G. barbadense* would be quite reasonable and admissible if there were no other objections from the standpoint of the Code. However, Todaro had already (Osservaz. Talun. Spec. Cotone 90. 1863, & Relaz. Cult. Cotoni 228. 1877) noticed that the plant illustrated by Plukenet had three-lobed leaves similar to the upper leaves of Sea Island cotton (*G. maritimum* Tod.), but a fruit resembling that of some East Indian species of cotton in its obtuse, almost entire-margined, reflexed bracteoles. Prokhanov (Taxon 8: 42. 1959) corroborated Todaro's observations and identified the capsule of Plukenet's drawing as that of *G. herbaceum*. Thus, Plukenet's drawing does not seem to portray a real plant, but rather presents a more or less imaginary composite plant with leaves approximately those of Sea Island cotton and capsule approximately that of *G. herbaceum*, thus a plant expressing Plukenet's concept of his collective species (which included the species of the New and Old Worlds) rather than a real plant. Plukenet's drawing presents heterogeneous material consisting of two discordant elements. Since the type material of *G. barbadense* L. is composed of two inseparable discordant elements, this Linnaean binomial must be rejected in compliance with Article 70 of the *International Code of Botanical Nomenclature* (1961). Wouters's proposal to regard the reflexion of the bracteoles of the involucl on the fruit of Plukenet's figure as the result of an interpretation can not be accepted, because in their shape and margin characters (not solely in their reflexed position) the bracteoles of involucl on Plukenet's figure certainly represent the cultivated Old World species. Thus, while disagreeing with Prokhanov in argument, I concur with his proposal that the binomial *Gossypium barbadense* L. must be replaced by *G. vitifolium* Lam. (*G. peruvianum* Cav.) as the correct name for the Sea Island cotton.

Having reviewed the situation concerning the typification of *Gossypium barbadense* L., I have come to the following conclusions:

1. *Gossypium barbadense* L. is a heterogeneous taxon consisting of two main elements, a plant grown in the botanical garden in Uppsala and a species established by Plukenet (Almagest. Bot. 172. 1696, & Phytogr. tab. 188, fig. 1. 1691).

2. Todaro's (1863) and Prokhanov's (1959) typifications of *Gossypium barbadense* by the plant grown in the botanical garden in Uppsala can not be accepted since the specimen in the Herbarium Linnaeanum (874.5), allegedly representing this plant and identified by Prokhanov as *G. arboreum* var. *nadam* (Watt) Prokh., was only questionably referred by Linnaeus to *G. barbadense* and therefore can not be chosen as the lectotype.

3. Watt seems to be correct in his assumption that *Gossypium barbadense* L. was based on Plukenet's diagnostic name and figure in Phytogr. tab. 188, fig. 1, which is the type of this species. However, the Plukenet

figure, in turn, is heterogeneous, presenting a composite, apparently more or less imaginary, plant with leaves resembling some of those in the Sea Island cotton and the capsule apparently that of *G. herbaceum* L. Therefore, the choice of Plukenet's figure as the lectotype of *G. barbadense* L. is not admissible under the *Code* (ICBN 1961, Art. 70).

4. Typification of *Gossypium barbadense* by the specimen *Plukenet vol. 100, folio 105* (the Sloane Herbarium of the British Museum) is not justifiable in the light of the *Code*, because Linnaeus did not see this specimen or at least did not mention it with the original description.

5. Since *Gossypium barbadense* L. can not be typified, the name must be rejected as a *nomen ambiguum* and must be replaced by *G. vitifolium* Lam., the earliest correct name.

#### THE SECTIONAL NAMES IN HUTCHINSON'S CLASSIFICATION (1947) OF GOSSYPIUM

In 1947, Hutchinson established a classification of *Gossypium* (in Hutchinson, Silow & Stephens, *The Evolution of Gossypium*, pp. 1-53), in which the genus was subdivided into eight sections. The sections, well-delimited morphologically and geographically, represented six main evolutionary, cytogenetically distinct groups, one of which was for convenience divided into three subsidiary groups also designated as sections. Apparently the simplicity, clarity, and easy use of this system led to its general adoption by geneticists and cytotaxonomists. Unfortunately, descriptions of the sections in this classification were given only in English, and the names therefore are not validly published. In order to make Hutchinson's classification nomenclaturally legitimate, I am listing below his sections, along with their correct names and the type species of each.

- Section I STURTIANA Hutchinson in Hutchinson, Silow, & Stephens, *Evolution of Gossypium* 16. 1947, *nom. illeg.* = Section *Sturtia* (R. Br.) Todaro, *Relaz. Cult. Cotoni* 117. 1877. TYPE SPECIES: *G. Sturtianum* J. H. Willis (*G. Sturtii* F. Muell., *nom. illeg.*).
- Section II ERIOXYLA Hutchinson, *loc. cit.* 18. 1947, *nom. illeg.* = Section *Erioxylum* (Rose & Standl.) Prokhanov, *Bot. Zhur. SSSR* 32: 71. 1947. TYPE SPECIES: *G. aridum* (Rose & Standl.) Skovst.
- Section III KLOTZSCHIANA Hutchinson, *loc. cit.* 22. 1947, *nom. illeg.* = Section *Integrifolia* Todaro, *Osservaz. Talun. Spec. Cotone* 19. 1863. TYPE SPECIES: *G. Klotzschianum* Anderss.
- Section IV THURBERANA Hutchinson, *loc. cit.* 24. 1947, *nom. illeg.* = Section *Thurberia* (A. Gray) Prokhanov, *Bot. Zhur. SSSR* 32: 71. 1947. TYPE SPECIES: *Thurberia thespesioides* A. Gray (= *G. Thurberi* Tod.).
- Section V ANOMALA Hutchinson, *loc. cit.* 27. 1947, *nom. illeg.* = Section *Anomopambak* Prokhanov, *loc. cit.* 66. 1947. TYPE SPECIES: *G. anomalum* Wawra & Peyr.
- Section VI STOCKSIANA Hutchinson, *loc. cit.* 30. 1947, *nom. illeg.* = Section *Pseudopambak* Prokhanov, *loc. cit.* 65. 1947. TYPE SPECIES: *G. Stocksii* Mast.
- Section VII HERBACEA Hutchinson, *loc. cit.* 32. 1947, *nom. illeg.* = Section *Gossypium*. LECTOTYPE SPECIES: *G. arboreum* L.

Section VIII **HIRSUTA** Hutchinson, *loc. cit.* 36. 1947, *nom. illeg.* = Section **Magnibracteolata** Todaro, Osservaz. Talun. Spec. Cotone 64. 1863. LECTOTYPE SPECIES: *G. mexicanum* Tod. = *G. hirsutum* L., fide Hutchinson, 1947; see Prokhanov, Bot. Zhur. SSSR 32: 72. 1947.

The union of the sections *Erioxylum*, *Integrifolia*, and *Thurberia* into a single section including all the American diploid species with the genome D, with consequent reduction of the sections to the rank of subsections, as was done by Mauer (1950), seems to me to be an improvement of Hutchinson's classification of *Gossypium*. These changes introduced by Mauer are given below.

Section **Integrifolia** Todaro, Osservaz. Talun. Spec. Cotone 19. 1863, amplif. Mauer, Acta Univ. Asiae Mediae II. 18(Biol. 7): 20. 1950. TYPE SPECIES: *G. Klotzschianum* Anderss.

Subsection **Integrifolia** Todaro, Relaz. Cult. Cotoni 188. 1877. (Sect. *Klotzschiana* Hutchinson, *loc. cit.*, *nom. illeg.*)

Subsection **Ingenhousia** (Moc. & Sessé ex DC.) Mauer, *loc. cit.*, excl. **Erioxylum** Rose & Standl. Contr. U. S. Natl. Herb. 13: 307. 1911. (Sect. *Ingenhousia* (Moc. & Sessé ex DC.) Prokhanov, *loc. cit.* 72, in part, and sect. *Thurberia* (A. Gray) Prokhanov, *loc. cit.* 71. 1947. Sect. *Thurberana* Hutchinson, *loc. cit.* 24. 1947, *nom. illeg.*). TYPE SPECIES: *G. trilobum* (Moc. & Sessé ex DC.) Kearney (*Ingenhousia triloba* Moc. & Sessé ex DC.).

Subsection **Caducibracteolata** Mauer, *loc. cit.*, emend. Brizicky (Sect. *Erioxylum* (Rose & Standl.) Prokhanov, *loc. cit.* 71, and sect. *Ingenhousia* (Moc. & Sessé ex DC.) Prokhanov, *loc. cit.* 72, in part. Sect. *Erioxyla* Hutchinson, *loc. cit.* 18. 1947, *nom. illeg.*). LECTOTYPE SPECIES: *G. armourianum* Kearney.

Delimitation of the subsections *Ingenhousia* and *Caducibracteolata* has been slightly changed in order to bring their limits as close as possible to those of Hutchinson's corresponding sections.